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NiCrMo-3 Nickel-Alloy Welding Consumables

FCAW	MIG/TIG	SMAW
SFC-625	SMG-625、STG-625	SNM-3

In recent advance and industrial applications on Offshore Construction, Nuclear Power and Chemical Facilities has corrosion and heat resistance requirement.

Therefore, NiCrMo-3 had been provided in most applications. Such as low temperature High-Alloyed steel, Heat-Resistant steel, 9% Ni and also suitable for joint metals of the type mentioned above.

APPLICATIONS

	Pressure Vessel	Nuclear Reactor Parts, Boiler Pipe, Heat Exchanger, Heating Valves.
	FGD Plant	FGD Stack, Absorber, Perforated Tray, Booster Fan, Fume Liner.
	Chemical Equipment	Sulphuric-Acid cooling tower.
	Aerospace Parts	Engine Parts, Jet Engine Parts, Spaceship Parts.
	Pulp & Paper Industry	Headbox for Pulp and paper Industry.
	Offshore & Marine Construction	Pipe for steam system, Scrubber systems.
Other	Others	Marine Construction could tolerance high mechanical stress and saltwater, e.g. Workplace in chloride salts circumstance.

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NiCrMo-3 for Nickel Alloy	FCAW SFC-625	AWS	A5.34 ENiCrMo3T1-4

FLUX CORED WIRED for NICKEL-ALLOY - 「SFC-625」

For SFC-625 is designed with all positional welding. The product is suitable for UND N06625, N08800 base metal and to others Nickel-Alloy.

Normally buttering in dissimilar base metals (e.g. NiCrMo Alloys to stainless and carbon steels) joints and buffer layer in cladding. This alloy is designed for the high temperature strength and resistance to general corrosion. And it's also used for 9% Ni Steels level with low temperature by -196℃.

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SFC-625

	KEY FEATURES		
1.	All positional welding (1.2MM180A/26~28V).		
2.	Good weldability.	5.	Slag removal with smooth bead appearance.
3.	Sable Welding Arc.	6.	Less spatter.
4.	Excellent mechanical properties.		

	Note on Usage		
1.	Ensure the right grinding wheel for different weld metal.	5.	Appropriate heat input.
2.	Suitable for shielding CO2 or Mix Gas (M21).	6.	Avoid crater defect on bead end.
3.	Keep roller for welding wire transfer smoothly.	7.	Ensure slag removed well.
4.	Use welding arc for M21 spray transfer.		

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Chemical Composition	C	Mn	Si	P	S	Ni	Cr	Mo	Nb	Ti	Cu	Fe
AWS A5.34 ENiCrMo3T1-4	0.100	0.50	0.5	0.020	0.015	58min	20-23	8-10	3.15-4.15	0.40	0.50	5.0
SFC-625(CO^2)	0.035	0.26	0.4	<0.001	<0.001	65.3	20.9	8.5	3.3	0.14	0.09	1.2
SFC-625(M21)	0.033	0.25	0.4	<0.001	<0.001	65.0	20.8	8.6	3.4	0.17	0.08	1.1

Impact Value* (@-196℃)	V1	V2	V3	V4	V5	V6	AVG
SFC-625	**64**	**54**	**61**	**62**	**56**	**56**	**59**

Tension Test :	T.S. Min. MPa(psi)	Y.P.	EL(%)
Requirements	690	/	25
ACTUAL (M21)	770	503	43

Suggested Welding Parameters	Diameter (mm) : 1.2
Voltage (Volt)	**25-32**
Current (Amp)	**150-200**
Stick out (m/m)	**15-25**
Gas Flow (l/min)	**20-25**

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Welding Performance : 1.2mm (1F) 200A/30V (M21)

Welding Performance : 1.2mm (2F) 200A/30V (M21)

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Welding Performance : 1.2mm(3G) 180A/27V (M21)

NiCrMo-3 Nickel Alloy	Solid Wire	AWS	A5.14 ERNiCrMo-3
	SMG-625 STG-625	JIS	Z3334 YNiCrMo-3
		CNS	Z7297 YNiCrMo-3
		GB	T15620 ERNiCrMo-3

Solid Wire for Nickel Alloy-「SMG-625、STG-625」

Designed for Gas tungsten arc welding and Shielded metal arc welding process with excellent heat and stress corrosion resistance. It can give excellent corrosion resistance to chloride induced stress corrosion cracking and a wide application for overlay and joint welding.

SMG-625、STG-625

	KEY FEATURES
1.	It delivers high deposition rate, increases the weld efficiency and generates very little fume.
2.	Excellent impact value at low temperature. Better than SMAW & FCAW.
3.	Base Metal Recommend: 3.1：ASTM-ASME UND N06625, A494 CW-6MC (Casting tools), 9% Ni base metal steels. 3.2：High-Nickel Alloyed Steel: INCONEL601, 800H, 825. 3.3：A range of Super Austentic Stainless Steels: UNC S31254, 254SMO, 904L..etc.

SMG-625、STG-625

	Note on Usage
CLEAN	Clean surface to be weld.
TEMPERATURE	Preheat ≧16℃ ; Keep Interpass ≦150℃ (recommend ≦100℃)
HEAT INPUT	In order to avoid intergranular attack, please make sure lower heat input during welding.
SHORT WELDING ARC	In order to avoid porosity, please keep short welding arc.
MANAGEMENT	In order to avoid crater defect issue, please control arc welding from start to end.
GRINDING	In order to avoid crack issue on welding beads, please ensure the right grinding wheel for different weld metal.
POWER	In order to avoid poor penetration during welding, please keep stable welding power source.
Magnetic Arc Blow	Wrap the work cable around the workpiece so that the DC current returning to the power supply passes through it in such a direction that the magnetic field set up will tend to neutralize the magnetic field causing the arc blow.

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SMG-625 Chemical Composition of Weld Metal

Chemical Composition	C	Mn	Fe	P	S	Si	Cu	Ni	Al	Ti
AWS A5.14 ERNiCrMo-3	≤0.10	≤0.50	≤5.0	≤0.02	≤0.015	≤0.50	≤0.50	≥58.0	≤0.40	≤0.40
SMG-625	0.003	0.04	0.11	0.001	0.001	0.100	0.001	64.72	0.03	0.19

Chemical Composition	Cr	Nb+Ta	Mo	Other Total
AWS A5.14 ERNiCrMo-3	20.0-23.0	3.15-4.15	8.0-10.0	≤0.50
SMG-625	22.08	3.69	8.97	0.06

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SMG-625 MECHANICAL PROPERTIES

Required Tests	TYPICAL MECHANICAL PROPERTIES OF WELD METAL			TYPICAL IMPACT VALUES	
	YP(MPa)	TS(MPa)	EL(%)	J/℃	
AWS A5.14 ERNiCrMo-3	--	≧760MPa	≧30%	-196℃	≧27J
Typical Results (75%Ar+25%He)	495MPa	774 Mpa	46.6%	-196℃	147，153，150 J 平均 150 J

SMG-625 Suggested Welding Parameters

Diameter (mm)	Resulting Current	Normal Arc Voltage	Workpiece Dimensions	Shielding Gas	Transfer Mode
0.9mm	70~90A	19~22V	2~5mm	75%Ar+25%He	Short Circuiting Transfer
1.2mm	80~160A	17~24V	3~20mm	75%Ar+25%He	Short Circuiting Transfer
1.2mm	190~240A	30~32V	≥10mm	100%Ar	Spray Transfer
1.2mm	120~150A	18~22V	3~20mm	75%Ar+25%He	Pulsed Spray

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SMG-625 Weld Appearance：3G Position 150A/24V，Gas:75%Ar+25%He

Root Pass	Filling Pass	Capping Pass
		

SMG-625 Fillet Weld Appearance

3F Position 140A/22V Gas:75%Ar+25%He	2F Position 150A/24V Gas:75%Ar+25%He
	

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STG-625 Chemical Composition of Weld Metal

Chemical Composition	C	Mn	Fe	P	S	Si	Cu	Ni	Al	Ti
AWS A5.14 ERNiCrMo-3	≤0.10	≤0.50	≤5.0	≤0.02	≤0.015	≤0.50	≤0.50	≥58.0	≤0.40	≤0.40
STG-625	0.003	0.05	0.15	0.001	0.001	0.12	0.001	64.83	0.02	0.18

Chemical Composition	Cr	Nb+Ta	Mo	Other Total
AWS A5.14 ERNiCrMo-3	20.0-23.0	3.15-4.15	8.0-10.0	≤0.50
STG-625	22.18	3.54	8.90	0.024

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STG-625 MECHANICAL PROPERTIES

Required Tests	TYPICAL MECHANICAL PROPERTIES OF WELD METAL			TYPICAL IMPACT VALUES	
	YP(MPa)	TS(MPa)	EL(%)	J/℃	
AWS A5.14 ERNiCrMo-3	--	≧760MPa	≧30%	-196℃	≧27J
Typical Results (75%Ar+25%He)	518MPa	782Mpa	40%	-196℃	104，98，102 J 平均 101 J

STG-625 Suggested Welding Parameters

Diameter (mm)	Resulting Current	Normal Arc Voltage	Shielding Gas
1.6mm	40~80A	9~13V	100%Ar
2.4mm	60~160A	9~14V	100%Ar
3.2mm	80~200A	10~15V	100%Ar

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STG-625 TYPICAL CHEMICAL COMPOSITION OF WELD METAL

1G Position 120A Gas:100%Ar-Root Pass	1G Position 150A Gas:100%Ar-Filling Pass	1G Position 150A Gas:100%Ar-Capping Pass
		

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STG-625 Fillet Weld Appearance

3F Position 150A Gas:100%Ar	2F Position 150A Gas:100%Ar
	

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NiCrMo-3 Nickel Alloy	SMAW	AWS	A5.11 ENiCrMo-3
	SNM-3	JIS	Z3224 ENi6625
		EN	ISO 14172 E Ni6625
		GB	T13814 ENiCrMo-3

Stick Electrode for Nickel Alloy: -「SNM-3」

SNM-3 is designed by High-Alloyed with excellent corrosion resistance. Add Nb composition to avoid chromium carbide precipitation. Neither for intergranular attack and suitable for low temperature condition by -540℃.

Reference:

1. FGD STACK by FORMOSA HEAVY INDUSTRIES CORP.
2. TAIWAN RIFING BUSINESS DIVISION DALIN PLANT SULFUR RECOVERY UNIT 10TH CONSTRUCTION PROJECT by CTCI (CPC).

Chemical Composition	C	Mn	Si	Cr	Ni	Mo	Fe	Nb+Ta	P	S
AWS A5.11 ENiCrMo-3	≦0.10	≦1.00	≦0.75	20.0~23.0	≧55.0	8.0~10.0	≦7.0	3.15~4.15	≦0.03	≦0.02
SNM-3	0.04	0.54	0.35	22.2	62.4	9.07	1.8	3.40	<0.001	<0.001

Specification	ASTM G28A A262B			ASTM A262 C			GB/T4334-2008E Intergranular Corrosion Testing		
Required Tests	Liquid	Temperature	Time	Liquid	Temperature	Time	Liquid	Temperature	Time
	$H_2SO_4/Fe_2(SO_4)_3$	Boiled	24~120h	65% HNO3	Boiled	240h	$H_2SO_4/CuSO_4$	Boiled	16h
Typical Results	Corrosion rate（mm/a）:0.96			Corrosion rate（mm/a）: 0.71			Indicate intergranular attack without cracks or fissures		

ITEM	Mechanical Properties			
	YP(MPa)	TS(MPa)	EL(%)	J/℃
AWS A5.11 ENiCrMo-3	--	>760	>30	--
SNM-3	499	798	44	57J /-196℃

SNM-3 Suggested Welding Parameters

Diameter (mm)		2.6	3.2	4.0	5.0
Length (mm)		300	350	350	350
Voltage	1G	60-90	70-120	100-150	120-180
	3G	55-80	65-110	80-130	

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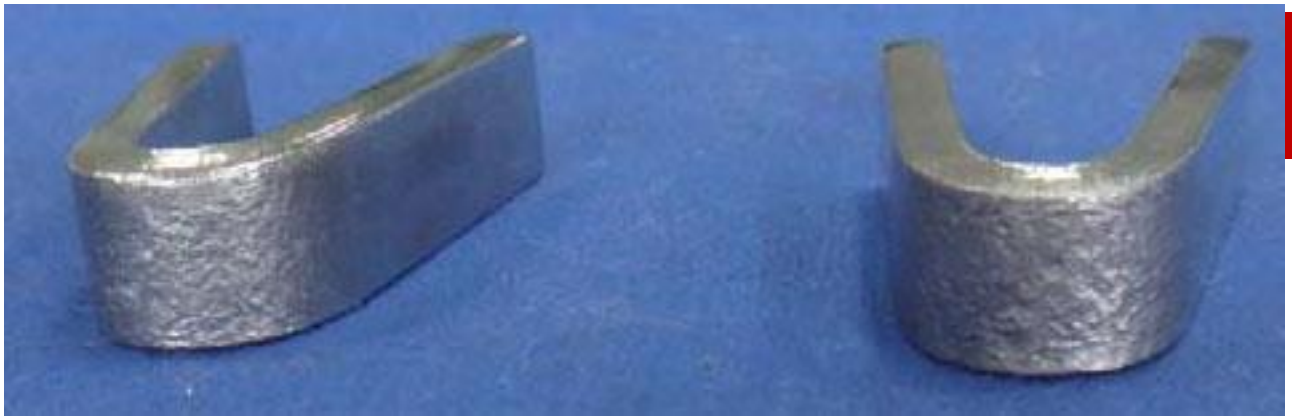
Intergranular Corrosion Testing



Intergranular Corrosion Testing

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